Course Title: Network and Systems Administration
Course no: 407   **Full Marks**: 60+20+20
Credit hours: 3   **Pass Marks**: 24+8+8

Nature of course: Theory (4 Hrs.) + Lab (3 Hrs.)

Synopsis: Provides the concept of network and system administration

Goal: The class concentrates on the network and system administration, and covers subjects ranging from initial installation of OS to day-to-day administrative tasks such as Network and Server Configurations, management of user accounts and disk space, and even imparting the trouble-shooting skills future system administrators will need to cope with unexpected behavior.

Course Contents:

1 Networking Overview   **4Hrs**
    1.1 History
    1.2 Protocol Standards – *networking protocols overview*
    1.3 Reference Model (OSI, TCP/IP)
      1.3.1   Overview, comparison OSI and TCP-IP
    1.4 Windows and Linux Networking Basics -*overview*
    1.5 Switching and Routing basics – *Circuit/packet/message switching, Unicast/multicast/broadcast/anycast routing overview*

2 Server Administration Basics   **6Hrs**
    2.1 Server and Client Installation – *client/server differences, Linux client/server installation practical approach*
    2.2 Boot Process and Startup Services: Xinetd/Inetd – *Protocol/interfaces/servicces*
    2.3 Managing accounts: users, groups and other privileges
    2.4 File Systems and Quota Management – *unix and windows file system*
    2.5 Job Scheduling with cron, crontab, anacron and system log analysis
    2.6 Process controlling and management – *linux process management*
    2.7 Online Server upgrade/update process – *upgrade/update tools in linux*
    2.8 Administering Database Server (MySQL)

3 Network Configuration Basics   **4Hrs**
    3.1 IPv4 and IPv6 addressing
    3.2 Network Interface Configuration
    3.3 Diagnosing Network startup issues
    3.4 Linux and Windows Firewall configuration – *IP/IPv6tables*
    3.5 Network troubleshooting commands

4 Dynamic Host Configuration Protocol (DHCP)   **4Hrs**
    4.1 DHCP Principle

4.2 DHCP Server Configuration
4.3 DHCP Options, Scope, Reservation and Relaying
4.4 DHCP Troubleshooting

5 Name Server and Configuration   **6Hrs**
5.1 DNS principles and Operations
5.2 Basic Name Server and Client Configuration
5.3 Caching Only name server -*DNSCACHE*
5.4 Primary and Slave Name Server
5.5 DNS Zone Transfers
5.6 DNS Dynamic Updates
5.7 DNS Delegation
~~5.8 DNS Server Security~~
5.9 Troubleshooting

6 Web and Proxy Server Configuration   **6Hrs**
6.1 HTTP Server Configuration Basics
6.2 Virtual Hosting
6.3 HTTP Caching
6.4 Proxy Caching Server Configuration
6.5 Proxy ACL
6.6 Proxy-Authentication Mechanisms – *NTLM Auth, Proxy-MySQL Auth,*
    Proxy-Radius Auth Basics
6.7 Troubleshooting

7 FTP, File and Print Server   **(5Hrs)**
7.1 General Samba Configuration
7.2 SAMBA SWAT
7.3 NFS and NFS Client Configuration
7.4 CUPS configuration basics
7.5 FTP Principles
7.6 Anonymous FTP Server
7.7 Troubleshooting

8 Mail Server basics   **6Hrs**
8.1 SMTP, POP and IMAP principles
8.2 SMTP Relaying Principles
8.3 Mail Domain Administration
8.4 Basic Mail Server Configuration (Sendmail, postfix, qmail, exim..)
8.5 SPAM control and Filtering
8.6 Troubleshooting

9 Remote Administration and Management   **4hrs**
9.1 Router Configuration – *RIP/OSPF Router*
9.2 Webmin/usermin
9.3 Team Viewer
9.4 Telnet
9.5 SSH
9.6 SCP, Rsync

Text Books:
1. The Practice of System and Network Administration, Second Edition
   Thomas A. Limoncelli, Christina J. Hogan , Strata R. Chalup
2. Advanced Linux Networking, Roderick W. Smith, Addison-Wesley Professional (Pearson Education), 2002.
3. Linux Network Administrator's Guide, Tony Bautts, Terry Dawson, Gregor N. Purdy, O'Reilly, Third Edition, 2005

Prerequisite: Computer Networking Course

Laboratory:
1. Server/Client Installation over VMware Environment
2. Packet Analysis by using TCPDUMP and WIRESHARK
3. Network Practice with Packet Tracer
4. System Administration: User/Group management, File System Management ….
5. Network Configuration: Start/Stop network Service, network interface configuration
6. Firewall Configuration
7. DNS and DHCP Configuration and Troubleshooting
8. Web and Proxy Server Configuration and Troubleshooting
9. Basic Mail Server Configuration and Troubleshooting
10. SAMBA, NFS, CUPS and FTP configuration and Troubleshooting
11. Webmin/SSH configuration

Recommended for Practice:
1. Packet Analysis by using TCPDUMP and WIRESHARK
2. Network Practice with Packet Tracer

Model Question (Network and System Administration)

Tribhuvan University
Institute of Science and Technology
B.Sc. CSIT Seventh Semester

Model Question

FM: 60   **PM: 24**   **Time: 3 Hrs.**

BSc. CSIT /Seventh Semester/Network and System Administration

Attempt any FIVE Questions.

1. [a] What do you mean by Networking Protocols? Compare TCP/IP with OSI Reference Model.   [3+3]
   [b] How many ways a Linux client acquire IPv4 address? Explain.   [6]
2. [a] Explain the Linux booting process with server installation steps.   [6]
   [b] What are the usage and importance of cron, anacron and at? Explain the steps to configure and enable system logging in Linux.   [3+3]
3. [a] What is NATng? Describe iptables configuration for NATng in Linux with example. [3+3]
   [b] Explain with principle the DHCP server and client communication process. [6]
4. [a] Explain how cashing-only name server works? What is the difference between iterative and recursive approach of DNS queries.   [3+3]
   [b] What is HTTP? Explain the steps to configure HTTP-APACHE server for Linux virtual hosting of the website www.tu.edu.np.   [1+5]
5. [a] What is SAMBA? How do you administer SAMBA with SAMBA-SWAT? Compare SAMBA with NFS.   [2+4]
   [b] Define the term MUA, MTA, MDA and MAA with protocol example. What do you mean by SMTP relay?   [4+2]
6. [a] What are the features of webmin? How do you maintain the security while remote administrating of the Linux server.   [2+4]
   [b] Differentiate between routed and routing protocol. Explain the process of DR/BDR election process in OSPF routing.   [2+4]
7. Write short Motes on (Any Three)   [4+4+4]
   [a] Cashing Only Name Server
   [b] Proxy-ACL
   [c] NFS Client Configuration
   [d] SSH Configuration Basics
   [e] Properties and features of IMAP server